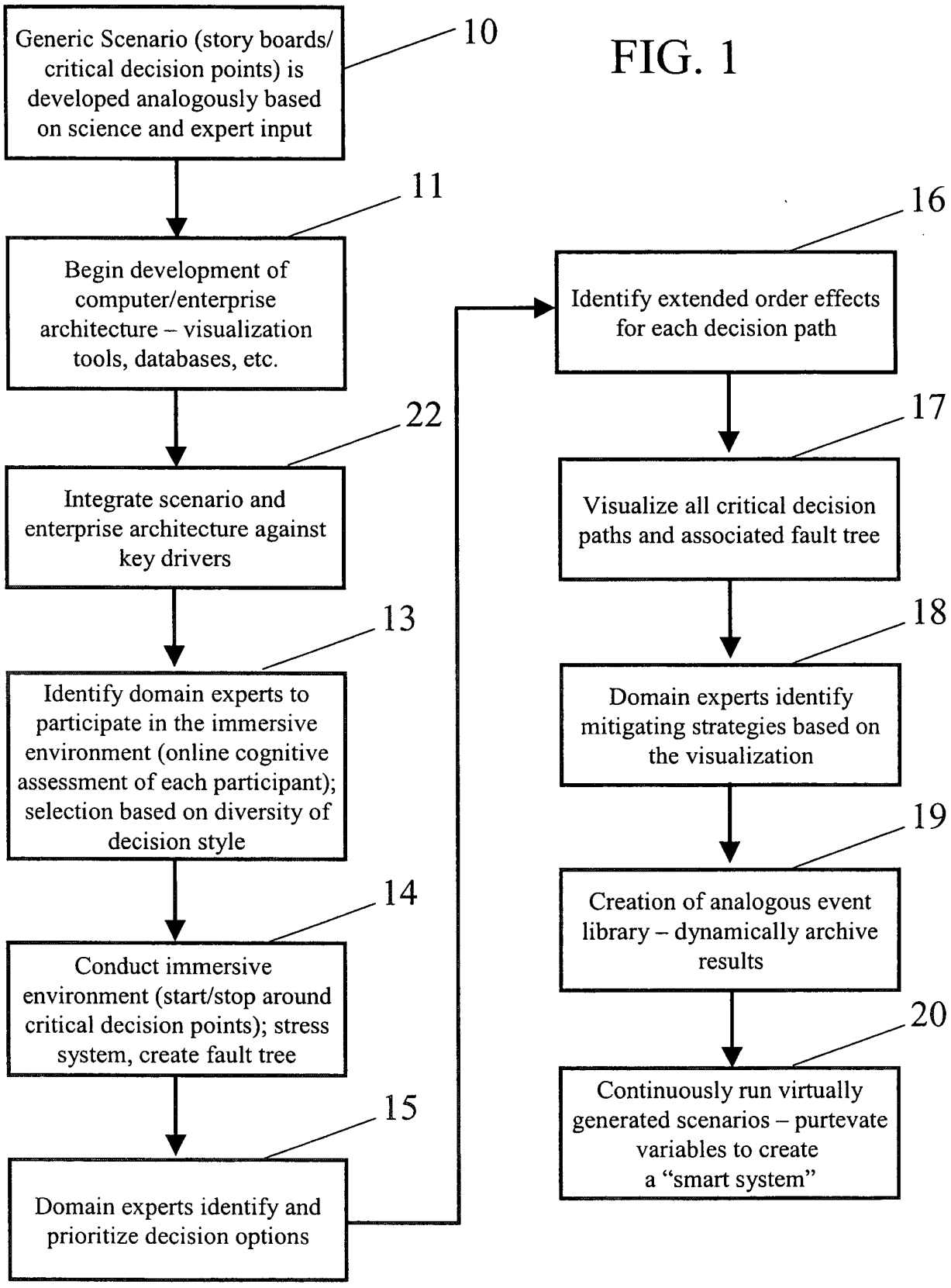
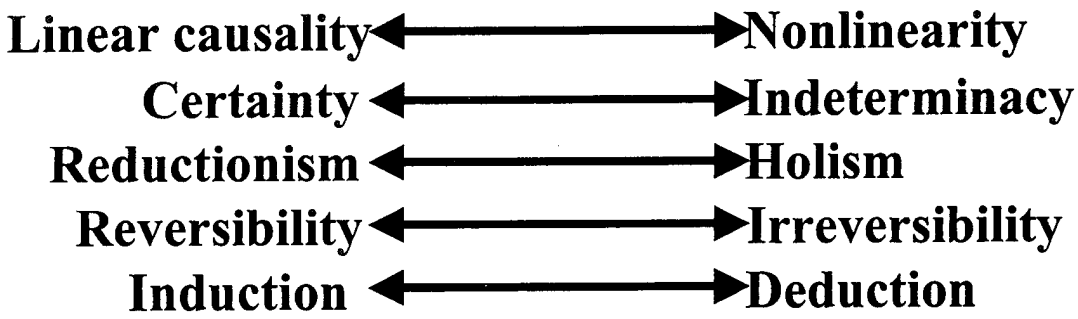

Generic Scenario (story boards/ critical decision points) is developed analogously based on science and expert input
10
Begin development of computer/enterprise architecture – visualization tools, databases, etc.
11
Integrate scenario and enterprise architecture against key drivers
22
Identify domain experts to participate in the immersive environment (online cognitive assessment of each participant); selection based on diversity of decision style
13
Conduct immersive environment (start/stop around critical decision points); stress system, create fault tree
14
Domain experts identify and prioritize decision options
15
Identify extended order effects for each decision path
16
Visualize all critical decision paths and associated fault tree
17
Domain experts identify mitigating strategies based on the visualization
18
Creation of analogous event library – dynamically archive results
19
Continuously run virtually generated scenarios – purtevate variables to create a "smart system"
20

FIG. 1

FIG. 2

The five cognitive frames of reference and their polar opposites are:



Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 3A

	Linear Causality	Reductionism	Certainty	Reversibility	Induction
Positivism	**Accept**	**Accept**	**Accept**	**Accept**	**Accept**
Logical Positivism	**Accept**	**Accept**	**Accept**	**Accept**	**Accept**
Post Positivism	**Accept**	**Accept**	**Reject**	**Accept**	**Accept**
Special and General Relativity Theory	**Accept**	**Accept**	**Accept**	**Accept**	**Reject**
Probability Theory	**Accept**	**Accept**	**Reject**	**Accept**	**Accept**

Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 3B

	Linear Causality	Reductionism	Certainty	Reversibility	Induction
Dissipative Structure Theory	Reject	Reject	Reject	Reject	Reject
Complexity Theory	Reject	Reject	Reject	Reject	Reject
Normal Accident Theory	Reject	Reject	Reject	Reject	Reject
Consilience Theory	Accept	Accept	Reject	Accept	Accept

Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 4A

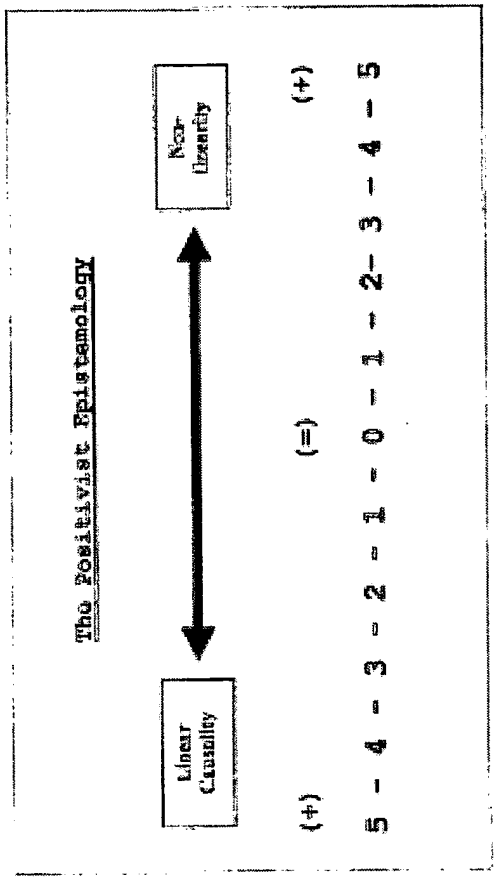

The Positivist Epistemology
Linear Causality
Non Linearity
(+)
(=)
(+)
5 - 4 - 3 - 2 - 1 - 0 - 1 - 2 - 3 - 4 - 5

FIG. 4B

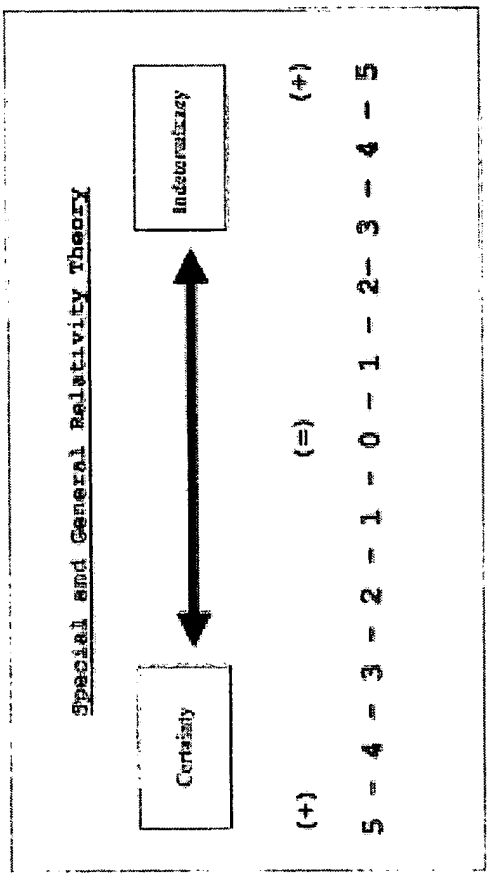

Special and General Relativity Theory
Certainty
Indeterminacy
(+)
(=)
(+)
5 - 4 - 3 - 2 - 1 - 0 - 1 - 2 - 3 - 4 - 5

FIG. 5

Periodic vs. Aperiodic Systems (Gleick, 1989)

Aperiodic → Cosmic → Indeterminate

Periodic → Human Senses → Determinate

Aperiodic → Quantum → Indeterminate

Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 6

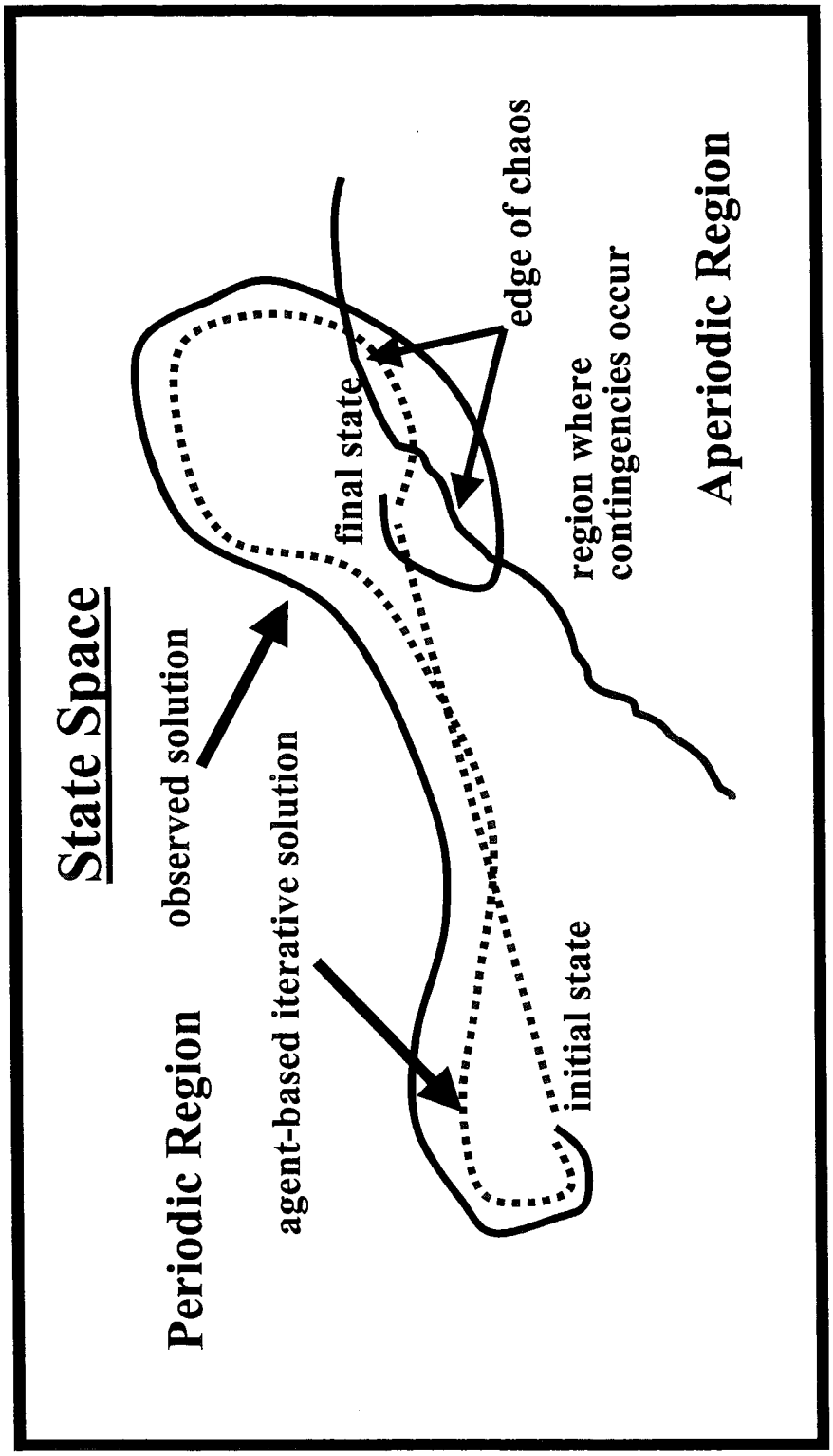

State Space
Periodic Region
observed solution
agent-based iterative solution
final state
initial state
edge of chaos
region where contingencies occur
Aperiodic Region

FIG. 7

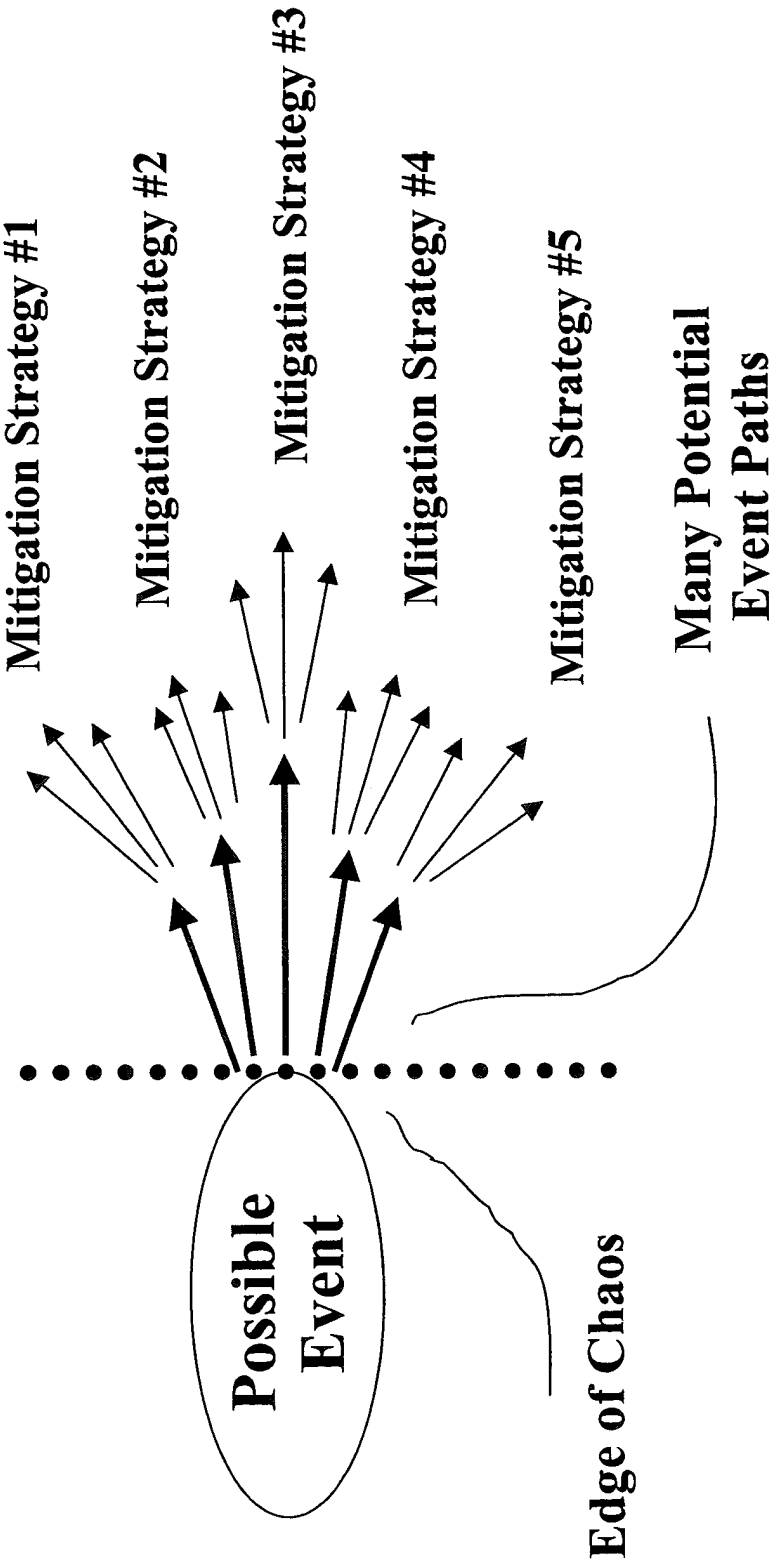
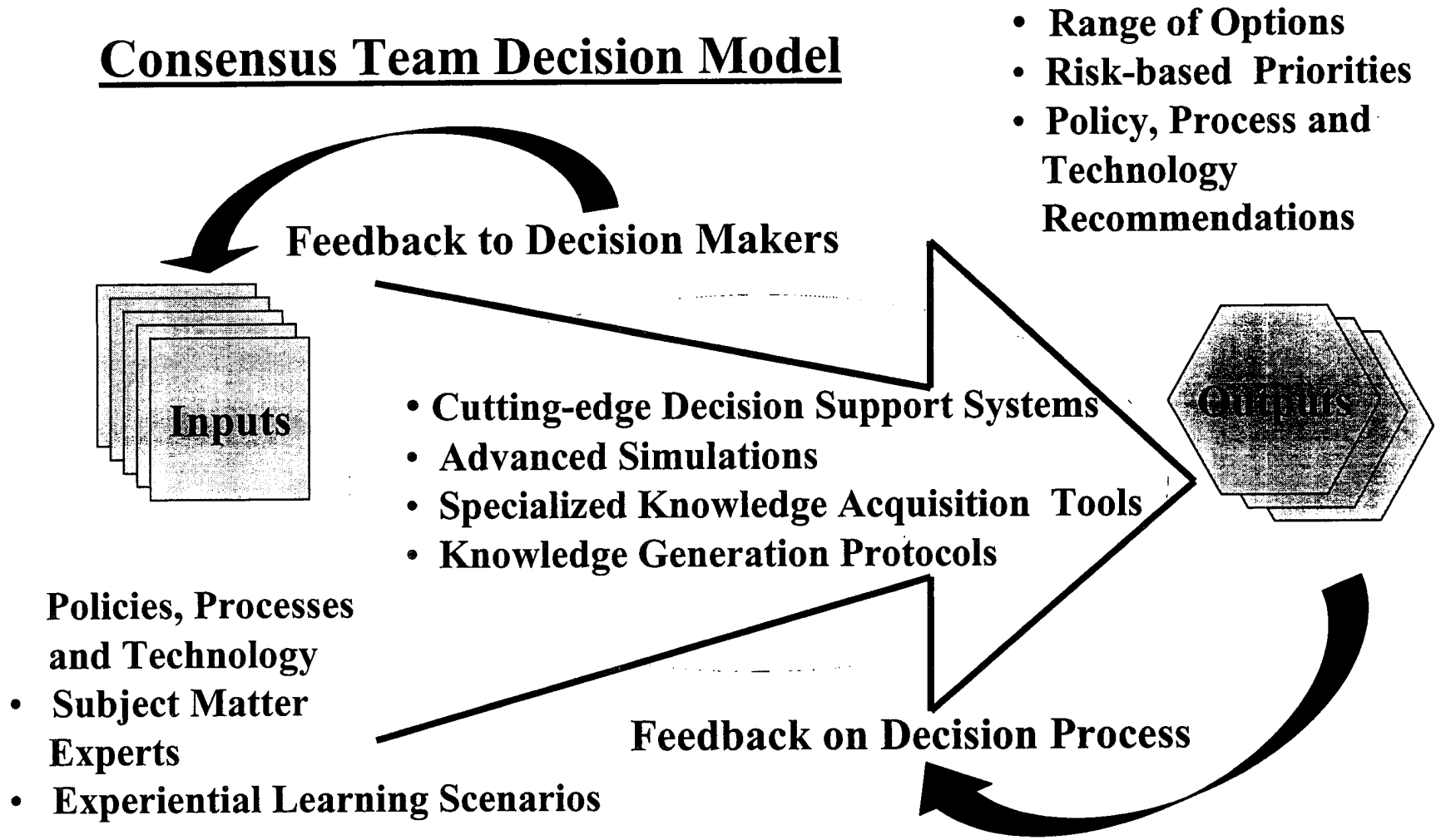

Mitigation Strategy #1
Mitigation Strategy #2
Mitigation Strategy #3
Mitigation Strategy #4
Mitigation Strategy #5
Many Potential Event Paths
Possible Event
Edge of Chaos

FIG. 8



Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 9

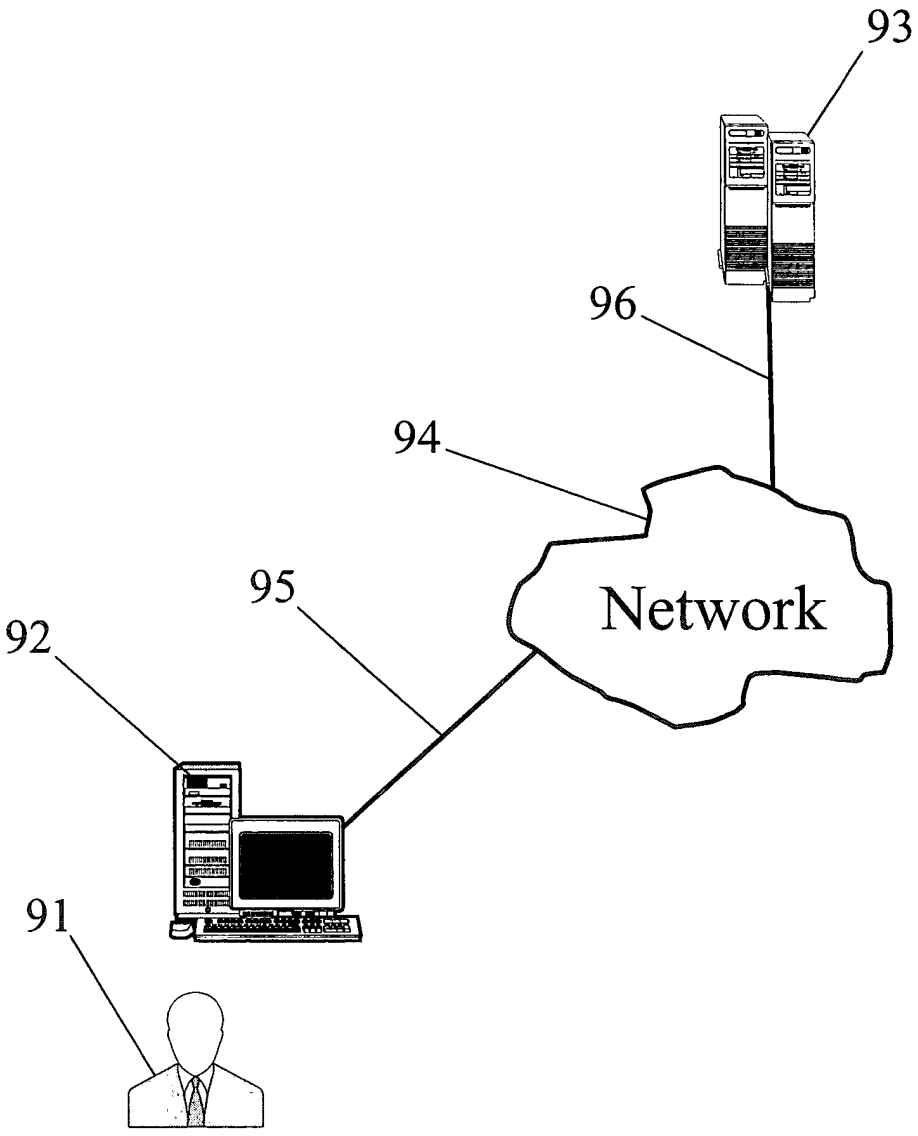


FIG. 10

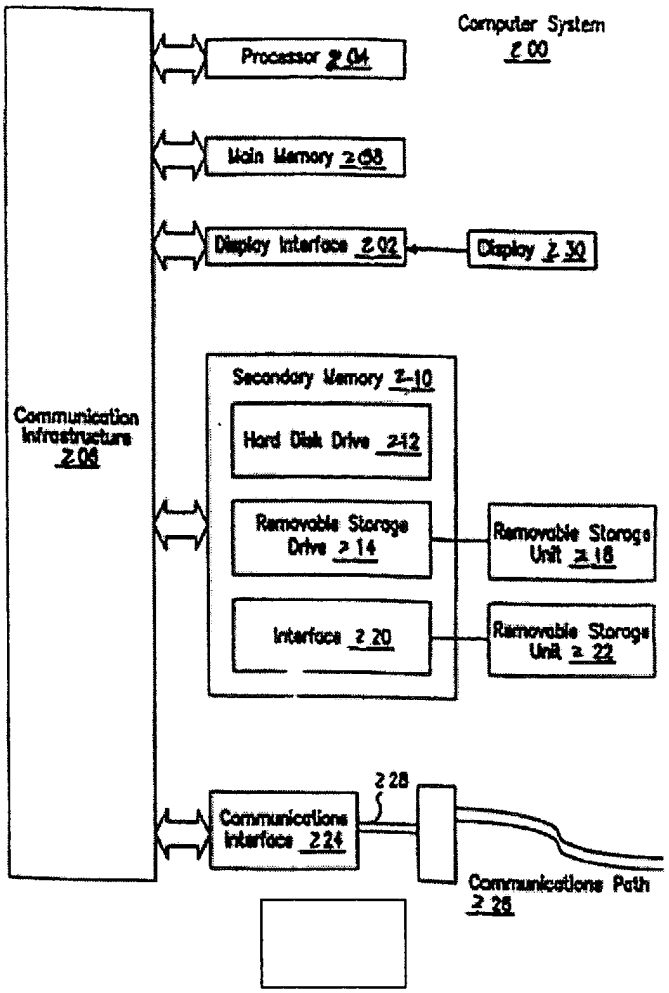
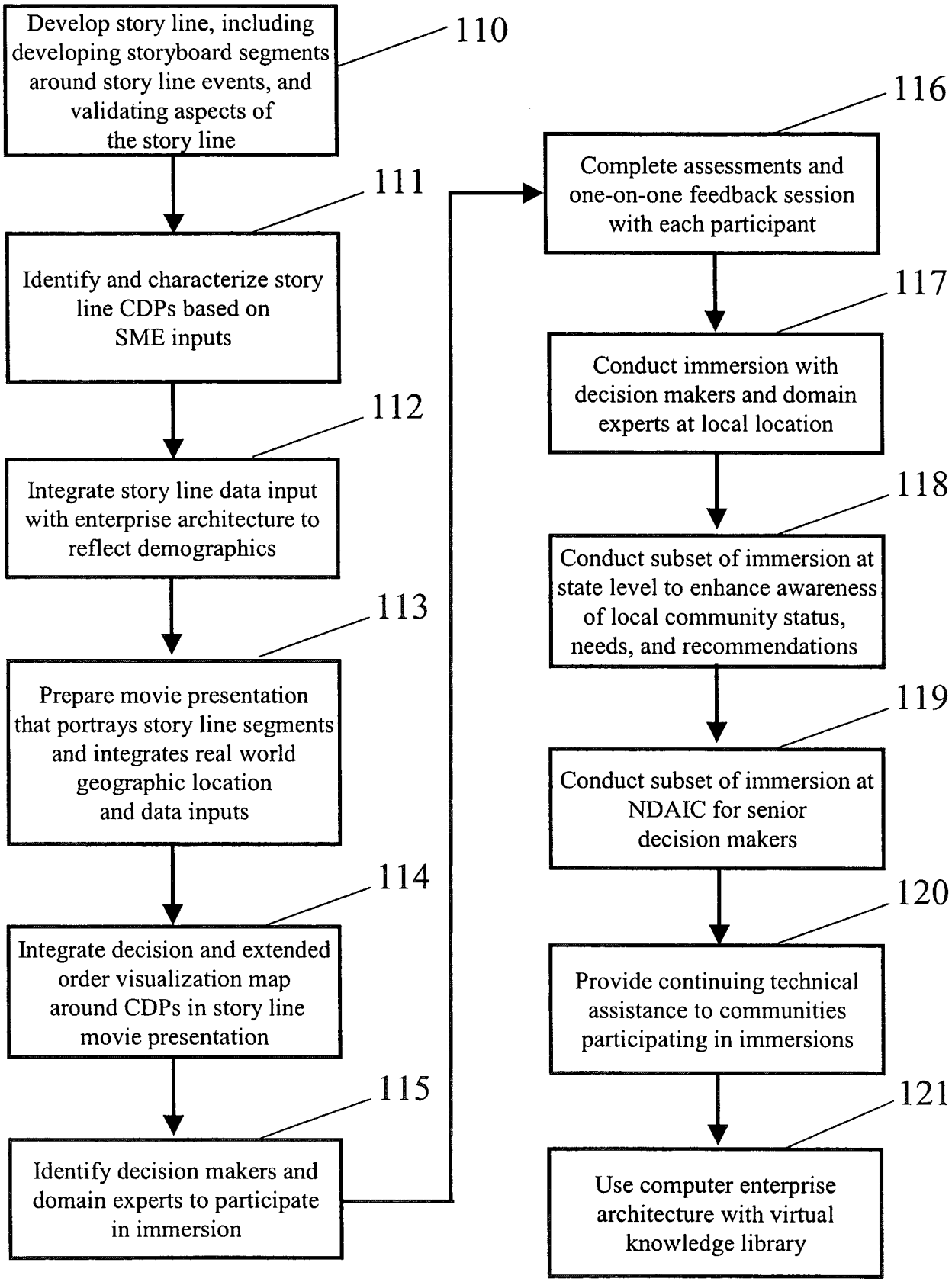
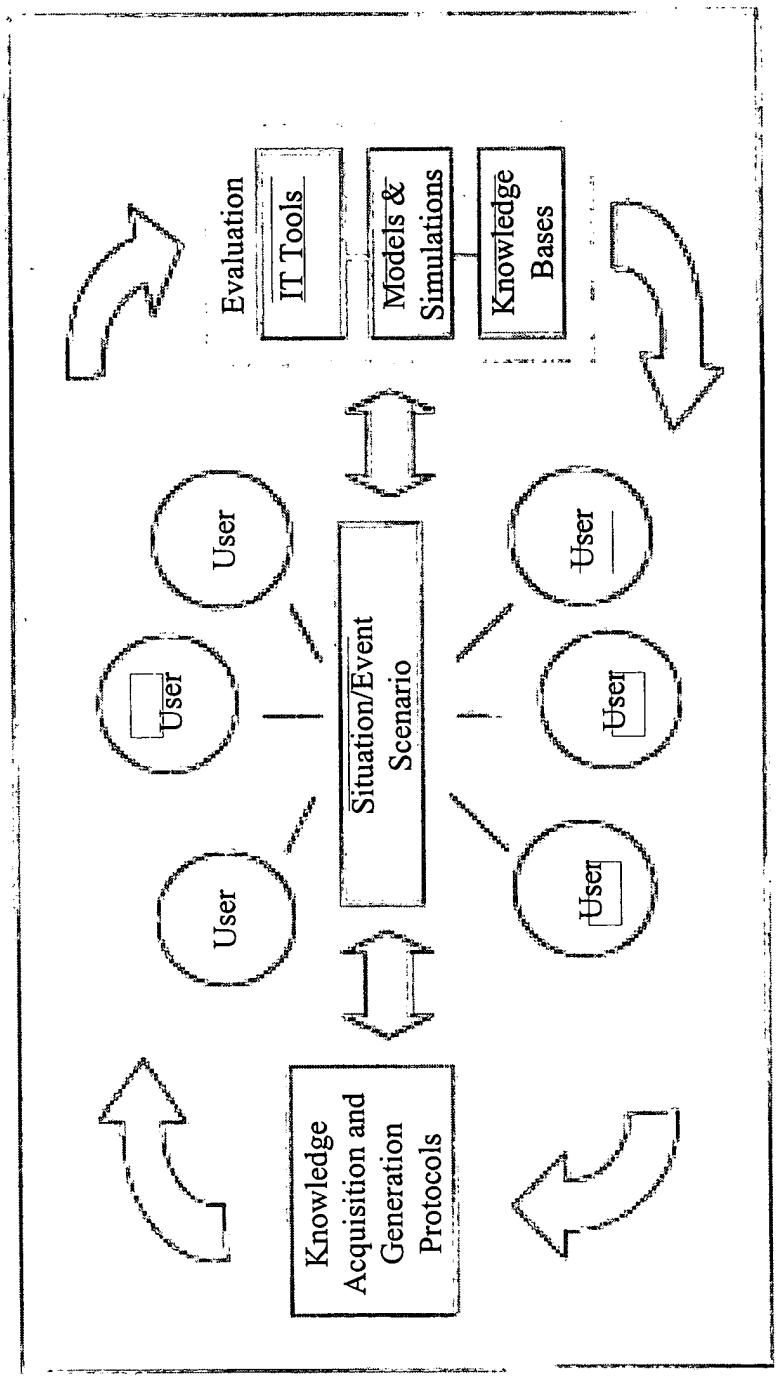

Computer System
200
Processor 204
Main Memory 208
Display Interface 202
Display 230
Communication Infrastructure 206
Secondary Memory 210
Hard Disk Drive 212
Removable Storage Drive 214
Removable Storage Unit 218
Interface 220
Removable Storage Unit 222
228
Communications Interface 224
Communications Path 226

FIG. 11



Docket No. 017018-00015
Title: Systems and Methods for Complexity Management
Inventor: John H. Hnatio

FIG. 12


Evaluation
IT Tools
Models & Simulations
Knowledge Bases
User
User
User
User
User
User
Situation/Event Scenario
Knowledge Acquisition and Generation Protocols